

REMARKS/ARGUMENTS

Though no related requirement was raised, Applicants have amended paragraphs [0007] and [0011] to correct spelling errors. Also, paragraph [0036] has been amended to eliminate attorney docket references to incorporated U.S. Patent Applications.

Claims 1-3 and 7-9 stand rejected under 35 U.S.C. 102(e) as being unpatentable over Koo. Claims 5 and 6 were allowed and claim 4 was objected to as being dependent upon a rejected base claim but was indicated as allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants gratefully acknowledge the recognition of the patentability of allowed claims 5 and 6. Applicants respectfully traverse the rejection of claims 1-3 and 7-9.

Basically, the present invention monitors battery state of charge (SOC) and if an extreme SOC – either extremely high or extremely low – is detected, makes a determination whether the combination of SOC and battery power flow into or out of the battery characterizes an incipient threat to battery condition. If such a threat is characterized, then a diagnostic monitoring of the SOC is invoked. The diagnostic monitoring provides for a duration of allowable operation within the extreme SOC that varies with how extreme the SOC is. The diagnostic routine essentially allows for lesser durations when the SOC is more extreme and longer duration when the SOC is not so extreme. The present invention thereby provides for continued operation in a region of extreme SOC such that power flows that trend the SOC out of the extreme SOC region will be allowed to continue improving the SOC whereas power flows that trend the SOC deeper into the extreme regions of SOC will meet with more abbreviated operating durations.

Thus, in accordance with the method of claim 1 for example, critical state of charge condition is diagnosed by a method including obtaining power flow and state of charge for the energy storage system, determining if the combination of power flow and state of charge meet predetermined criteria and, if the predetermined criteria are met, indicating a critical state of charge condition if the state of charge is

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outside of a predetermined region of state of charge for a predetermined duration.

In accordance with a more specific implementation of the invention and consistent with claim 7, a critical state of charge condition is diagnosed by a method including within a predefined extreme range of state of charge, providing a plurality of state of charge thresholds and a corresponding plurality of unique increment values, with increment values being larger the further away the corresponding state of charge threshold is from a predefined non-extreme range of state of charge, periodically obtaining state of charge, and for so long as state of charge is outside of the predefined range of non-extreme state of charge, comparing the state of charge to the state of charge thresholds and selecting one of said increments in accord with the comparison, incrementing a counter with the selected increment, comparing the counter to a counter limit and providing an indication of a critical state of charge condition if the counter exceeds the counter limit.

On the other hand, Koo is concerned with reducing the cumulative error in battery SOC calculations by periodic resetting of the SOC to a certain level. In contradistinction to the claims of the present invention, Koo teaches methods concerned with battery state of health, though the terminology state of charge is employed (see col. 4, ll. 34-46). Applicants' claims are concerned with battery state of charge as set forth in the definitional example in paragraph [0007] – to wit "ratio of the residual charge in a battery or battery pack relative to full charge capacity" - which is essentially the definition that Koo indicates is not related to.

In rejecting claim 1, the Office Action appears to draw equivalence between the present claims "obtaining power flow" with Koo's teaching of discharge current and discharge current threshold. Applicants' claim language directed toward battery power flow is not the same as Koo's discharge current. The Office Action also appears to suggest equivalence between the present claims "determining if the combination of power flow and state of charge meet predetermined criteria" with Koo's teaching of theoretical discharge voltage and comparison to minimum discharge voltage. Applicants' claim language directed toward combination of power flow and state of charge is not the same as Koo's theoretical discharge voltage. Nor

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is there any equivalence or relatedness of Applicants' claim language directed toward meeting predetermined criteria corresponding to such combination with Koo's determination of the theoretical discharge voltage exceeding the minimum discharge voltage. Apart from these distinctions set forth above, the Office Action appears to jump from first equating power flow of Applicants with discharge current of Koo and then to discharge voltage of Koo. In any case, Applicants' claims are nowhere directed toward discharge currents, theoretical discharge voltages, or state of health as clearly set forth in the teachings of Koo. Additionally, the Office Action appears to draw equivalence between the present claims "if the predetermined criteria are met, indicating a critical state of charge condition if the state of charge is outside of a predetermined region of state of charge for a predetermined duration" with Koo's teaching of setting a very low SOC warning when the theoretical discharge voltage remains greater than the minimum discharge voltage. As pointed out herein above, there is no equivalence or relatedness of Applicants' claim language directed toward meeting predetermined criteria with Koo's determination of the theoretical discharge voltage exceeding the minimum discharge voltage.

In rejecting claim 7, the Office Action appears to draw equivalence between the present claims "within a predefined extreme range of state of charge, providing a plurality of state of charge thresholds and a corresponding plurality of unique increment values, said increment values being larger the further away the corresponding state of charge threshold is from a predefined non-extreme range of state of charge" with Koo's disclosure of various classifications of SOC as illustrated with respect to FIG. 4 of Koo. FIG. 4, however, merely discloses different sub-regions within a universal SOC region, each sub region having different ranges. Koo does not teach or suggest an association within these regions of a unique increment value as claim 7 sets forth. Furthermore, there is no way to draw an accurate or rational comparison of merely dividing the entire SOC region per Koo with a graduation of extreme regions of SOC and association of each with a unique increment value per Applicants' invention. The Office Action further attempts to draw a comparison between Applicants' limitation respecting "comparing the state of

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charge to the state of charge thresholds and selecting one of said increments in accord with the comparison" with Koo's various timer and counter resets in response to a change in the one of Koo's modules exhibiting the minimum voltage. There is no such minimum voltage module or equivalent in Applicants' invention nor is there any similarity in the resetting of the various timers and counters to the selection of increments of Applicants' invention. The remaining assertions in the Office Action respecting similarities or equivalence of the limitations of Applicants' claim 7 and the disclosure of Koo are met with similar disapproval.

It is well settled that "[a]nticipation requires the disclosure in a single prior art reference of each element of the claim under consideration." *W.L. Gore & Assocs. v. Garlock, Inc.*, 220 USPQ 303, 313 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984). And, "[a]bsence from the reference of any claimed element negates anticipation." *Row v. Dror*, 42 USPQ 2d 1550, 1553 (Fed. Cir. 1997) (quoting *Kloster Speedsteel AB v. Crucible, Inc.*, 230 USPQ 81, 84 (Fed. Cir. 1986)). Applicants have demonstrated that the Office Action has failed to meet this burden with respect to claims 1 and 7. Hence, claims 1 and 7 are not anticipated by Koo. For the same reasons, the remaining rejected claims 2, 3, 8 and 9 which all depend from one of claims 1 or 7 are not anticipated by Koo.

With respect to objected to claim 4, it too derives from claim 1. As such, having thus traversed the anticipation rejection of claim 1, the objection is adequately overcome by virtue thereof.

Applicants have not amended the claims because it is believed that the claims as they presently stand are patentably distinguishable over Koo.

Applicants respectfully request withdrawal of all rejections and objections. It is respectfully submitted that all pending claims are in condition for allowance and that same be allowed to proceed to issue.

If the Examiner has any questions regarding the contents of the present response he may contact Applicants' attorney at the phone number appearing below.

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Any fees associated with this response may be charged to General Motors
Deposit Account No. 07-0960.

Respectfully submitted,



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